LOCTITE®

EQUIPMENT
Operation Manual

Loctite®

Zeta® 7011-A Dosimeter-Radiometer for UVA
Part Number 98086

Zeta® 7011-V Dosimeter-Radiometer for UVV
Part Number 98089

Henkel

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1 Please Observe The Following

1.1 Emphasized Sections

⚠ **Warning!**
Refers to safety regulations and requires safety measures that protect the operator or other persons from injury or danger to life.

! Caution!
Emphasizes what must be done or avoided so that the unit or other property is not damaged.

☞ **Notice:**
Gives recommendations for better handling of the unit during operation or adjustment as well as for service activities.

1.2 For Your Safety

! Caution! IMPORTANT! Do not operate the unit before reading this section.

The Radiometer will be used to measure the UV Dose (energy) and UV Irradiance inside UV curing equipment.

1. UV protective glasses with side shields should be worn when working with and around the UV curing system.
2. Potentially exposed skin should be covered. Long sleeves and protective gloves should be worn when measuring dose and irradiance in the UV curing system.
3. Never look directly at the UV radiation source.

1.3 List of Parts Supplied

Zeta® 7011 Dosimeter-Radiometer
Operation Manual

2 Description

The Dosimeter-Radiometer measures the UV Dose (energy) and UV Irradiance inside the UV curing equipment. The Dosimeter-Radiometer is traceable to the National Institute of Standards and Technology (NIST). Spectral correction coefficients are implemented to use the Dosimeter-Radiometer with a broad band UV lamps. Units of measurement for the UV Dose (energy) are Joules per square centimeter (J/cm^2) and units for UV Irradiance are Watts per square centimeter (W/cm^2).

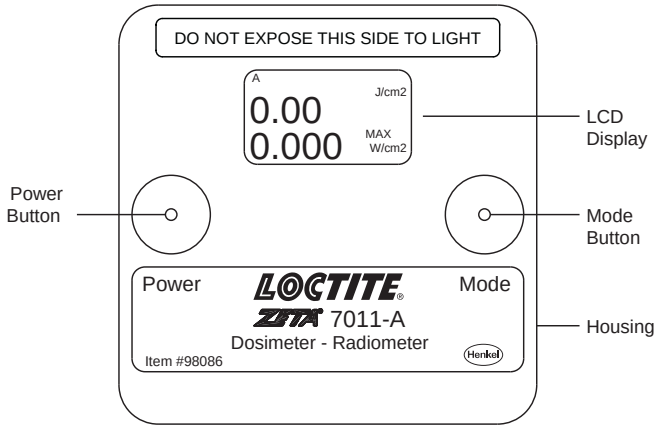


Figure 1. Display Side of Dosimeter-Radiometer.

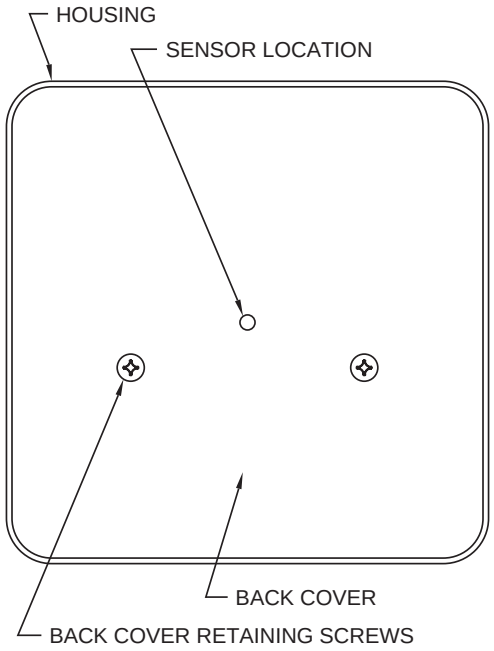


Figure 2. Sensor Side of Dosimeter-Radiometer.

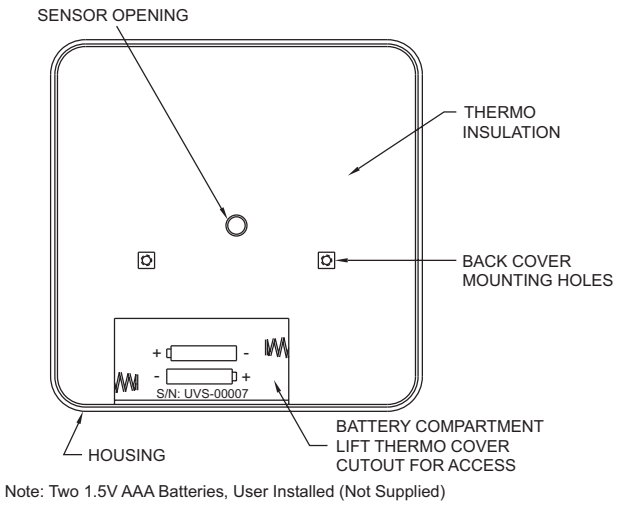


Figure 3. Sensor side of Dosimeter-Radiometer with cover removed to change batteries

2 Description (continued)

During measurements the side with the **"Power"** button, the **"Mode"** button, and the LCD display should be directed away from the UV radiation inside the UV curing equipment to prevent the LCD display from being damaged.

! CAUTION!

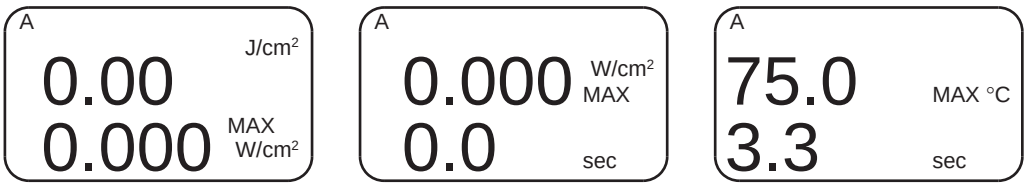
Exposing the LCD display to high intensity UV radiation will cause irreversible LCD damage. When taking measurements, be certain the LCD display side is facing away from light source. Also, the detector side of the unit should not be exposed to UV light for longer than 5 seconds or damage could occur.

2.1 Basic Data about Operation

The Dosimeter-Radiometer can be ordered in two variations to accommodate the different spectral ranges:

Zeta® 7011-A: UV A = 320 – 400nm

Zeta® 7011-V: UV V = 420 – 500nm



LCD Screen 1 LCD Screen 2 LCD Screen 3

2 Description (continued)

The LCD display has three modes of operation. The first display mode (mode 1) is activated after turning the power on and it shows the results from memory (the digits and units of measurement are not blinking). The second display mode (mode 2) is active while measuring, showing the results of current measurement during readings (the digits and units of measurement are blinking). The third display mode (mode 3) becomes active when current measurements are finished and shows the results of last finished measurements and only the units of measurement are blinking.

The Dosimeter-Radiometer shows results of measurements on a display having two rows. After the measurement is done, the dose and maximum irradiance can be seen simultaneously.

The Dosimeter-Radiometer has an internal temperature sensor that measures and stores the maximum internal temperature during exposure inside of the equipment. This feature allows detecting excessively high temperature that can cause damage to the unit.

The Dosimeter-Radiometer memory stores the results of last measurement until the beginning of next reading even when unit is turned off. After the beginning of a new reading, the old data is replaced with the new results.

The Dosimeter-Radiometer has a simple and intuitive logic of operation that displays the results of the last reading for five minutes if no new buttons are pressed. After five minutes it turns off automatically, saving the last results in memory for possible future analysis.

A simple one-button mode of operation can be used if the customer needs to measure only the dose and a maximum irradiance after each single reading (LCD Screen 1).

The two-button mode of operation allows seeing the dose (LCD Screen 1), the maximum irradiance(LCD Screen 2), and the maximum temperature after readings and times in seconds when maximum irradiance and maximum temperature were reached (LCD Screen 3).

3 Technical Data

3.1 Specifications

Loctite Model Part Number	Zeta® 7011-A, Zeta® 7011-V 98086 Zeta® 7011-A UVA 98089 Zeta® 7011-V UVV
Function	Self contained, one channel measuring device for reading UV energy and maximum irradiance inside UV curing equipment. Available in UV- A or V.

LCD Display	Two rows of digits
Energy/ Dose Range	0 to 250 Joules/cm^2
Operating Range	0.01 to 5W/cm^2
Irradiance Range	0.01 to 2W/cm^2
Accuracy	± 5% typical; ± 10% maximum
Spectral Response	UV A = 320 – 400nm Zeta® 7011-A UVA UV V = 420 – 500nm Zeta® 7011-V UVV
Operating Temp. Range	0-75°C internal temp. Maximum internal temp. 80°C.
Auto Shut Off	After 5 minutes the unit will shut off if no significant amount of energy is registered.
System Alarms	Two systems: 1.) Internal temp. over 75°C turns on sound alarm. Internal temp. over 80°C during exposure run turns unit off. 2.) Low battery indicator.
Electrical Power Required	Two user-replaceable 1.5V AAA size alkaline batteries (not included)
Battery Life	3000 readings or 2000 hours
Dimensions Lx W x D	102 mm x 102 mm x 13 mm (4" x 4" x 0.52")
Weight without batteries	200 g (5.7 oz.)
Calibration	NIST Traceable With Spectral Correction
Warranty	1 year

Note: For intensity measurements of LED devices emitting at the 405 nm wavelength, the Zeta 7011-V meter can be used to determine LED degradation. However, because the 405 nm wavelength is just outside the optimal absorbency range of the Zeta 7011-V, the reading could be lower than it actually is. Also, intensity readings from meter to meter may vary. That is to say, if two meters are used to measure the same LED device, the readings could be different. As long as the same meter is always used to measure the same 405 LED device, the Zeta 7011-V can be used to measure intensity degradation.

3 Technical Data (continued)

3.2 Calibration

The Dosimeter-Radiometer has been factory calibrated, prior to shipment, directly to the National Institute of Standards and Technology (NIST) primary physical standard for UV photodiodes.

Spectral correction coefficients are implemented to use the Dosimeter-Radiometer with a broadband UV lamp. The Calibration of the Dosimeter-Radiometer is stable indefinitely during non-use storage in its original packaging. Calibration is recommended at 12 month intervals after the unit is put into service. Contact Loctite at 1-860-571-5174 for calibration instructions.

4 Installation

4.1 Unpacking and Inspection

Carefully remove the system from its shipping carton and inspect it for any signs of damage. ANY DAMAGE SHOULD BE REPORTED IMMEDIATELY TO THE CARRIER. Refer to the list of supplied parts (section 1.3) to compare contents received to list of parts supplied. Report any missing parts promptly to the Loctite customer service department at 1-860-571-5174.

4.2 Installation and Start-up

To start using the Zeta® 7011 Dosimeter-Radiometer, two size AAA 1.5 Volt Alkaline Batteries (not included with unit) should be installed. To install batteries, unscrew two cover screws, put batteries in the battery compartment observing polarity. Replace cover and secure it with two screws (see section 2).

Start operation according to section 5.

5 Operation

5.1 One Button Operation Mode

1. **Press the "Power" button.** The unit turns on and shows the display service message about UV range of sensitivity for this unit (Letter A or V will be seen in the left top part of the LCD display. (See Mode 1, section 2.1) The unit will show the results of the last measurement stored in memory, the first number is the last measured dose in J/cm^2 and the second row shows the last measured maximum irradiance in W/cm^2.
2. **Place the unit in the UV curing system.** The unit should be placed with the LCD display down and input sensor window up. The unit automatically switches to running mode when it detects UV radiation and starts measuring the dose and irradiance showing the current results on the display.

! CAUTION!

Exposing the LCD display to high intensity UV radiation will cause irreversible LCD damage. When taking measurements, be certain the LCD display side is facing away from light source. Also, the detector side of the unit should not be exposed to UV light for longer than 5 seconds or damage could occur.

3. **Take the unit out of the UV curing system.** The unit will display the dose received while in the UV curing system. The irradiance level when the unit is taken out of system should be near zero. Digits and units are blinking.
4. **Press the "Power" button to stop integration.** The unit will display the dose and maximum irradiance measured while in the UV curing system.
5. **Press and hold the "Power" button to turn the unit off.** The unit will save the last results of measurement in memory and turn power off.

5.2 Two Button Operation Mode

1. **Press the "Power" button.** The unit turns on and shows (on display) the service message about the UV range of sensitivity for this unit (Letter A or V will be seen in the left top part of the LCD display). The unit will show the stored in memory results of the last measurement. The first row is the last measured dose in J/cm^2 and the second row is the maximum irradiance in W/cm^2. The unit is in the first display mode.
   a) See section 5.3 for additional options during the first display mode.
2. **Press and hold the "Mode" button for at least two seconds.**
   The unit begins the running mode that measures the dose and irradiance, showing current results in the display. Digits and units of measurement are blinking.
3. **Put the unit in the UV curing system.** The unit should be placed with the LCD display down and input sensor window up.

! CAUTION!

Exposing the LCD display to high intensity UV radiation will cause irreversible LCD damage. When taking measurements, be certain the LCD display side is facing away from light source. Also, the detector side of the unit should not be exposed to UV light for longer than 5 seconds or damage could occur.

4. **Take the unit out of the UV curing system.** The unit will display the dose received while in the UV curing system and the irradiance level when the unit is taken out of system should be near zero. **Digits and units of measurement are blinking.**
5. **Press the "Mode" button to stop integration.** The unit will display the dose and maximum irradiance measured while in the UV curing system.
6. **Press and hold the "Power" button to turn the unit off.** The unit will save the last results of measurement in memory and turn power off.

5.3 Additional Information Available in First Display Mode

The LCD display has three modes of operation (see section 2.1). The first display mode is activated after turning the power on and shows the results from memory. This mode has three screens to display and the results of the last measurement stored in memory. The screen modes can be seen after repeatedly pressing the **"Mode"** button. The initial display is in the first screen mode. The unit will show the stored in memory results of the last measurement, with the first row showing the last measured dose in J/cm^2, and the second row showing maximum irradiance in W/cm^2.

Press the "Mode" button. The display will be switched into the second screen mode. The unit shows stored in memory results of the last measurement, with the first row showing the maximum irradiance in W/cm^2, and the second row showing the time in seconds when the maximum irradiance was reached.
Press the "Mode" button. The display will be switched into third screen mode. The unit shows the stored in memory results of last measurement, with the first row showing the maximum temperature in °C, and the second row showing time in seconds when the maximum temperature was reached.
Press the "Mode" button. The display will be returned to the first screen mode. The unit will show the stored in memory results of the last measurement, with the first row showing last measured dose in J/cm^2, and the second row showing maximum irradiance in W/cm^2.
If the unit is in the first display mode *(when digits and units of measurement are not blinking)* and the unit detects UV radiation it will automatically switch on the running mode (second display mode) and will start measuring the dose and irradiance showing the current results on the display. **Digits and units of measurement are blinking.**

Pressing and holding the **"Mode"** button will also bring the unit into the running mode (second display mode) and will start measuring the dose and irradiance showing the current results on the display. **Digits and units of measurement are blinking.**

Pressing and holding the **"Power"** button turns the unit off. The unit will save the last results of measurement in memory and turn the power off.

5 Operation (continued)

5.4 Additional Information Available in Third Display Mode.

The third display mode becomes active when current measurements are finished and shows results of finished measurement. While the unit is in the third display **"Mode"** it has no automatic triggering on the running mode. This mode has three screens to display results of the finished current measurement. The screen modes can be seen after repeatedly pressing the **"Mode"** button.

1. Pressing and holding the "Mode" button for more than 2 seconds, will bring the unit into the running mode (second display mode) and will start measuring the dose and irradiance showing current results at the display. Digits and units of measurement are blinking. The unit will save the last results of measurement in memory and turn power off.
2. **Press the "Mode" button.** The display will be switched into the third screen mode. The unit shows the results of current finished measurement, with the first row showing the maximum temperature in °C, and the second row showing the time in seconds when the maximum temperature was reached.
3. **Press the "Mode" button.** The display will be returned to the first screen mode. The unit shows the results of the current finished measurement, with the first row showing the last measurement in dose in J/cm^2, and the second row showing maximum Irradiance in W/cm^2.

Pressing and holding the **"Mode"** button brings the unit into the running mode (second display mode) and will start measuring the dose and irradiance, showing the current results at the display. **Digits and units of measurement are blinking.**

While the unit is in the third display mode (when *only units of measurement are blinking*), it has no automatic triggering on the running mode (second display mode).

Pressing and holding the **"Power"** button turns the unit off. The unit will save the last results of measurement in memory and turn power off.

5.5 Auto-shut off and Signs of over heating

1. The unit automatically shuts off after 5 minutes if no UV radiation is present.
2. If internal temperature of the unit has exceeded 75°C during the last UV measuring (displaying data from memory) or during current UV measurement (displaying results of the finished measurement), the unit turns on an audible alarm. The alarm can be turned off by pressing the **"Mode"** button three times.
3. If internal temperature of the unit has exceeded 80°C during the exposure, the unit

turns the alarm on for 10 seconds and turns the power off. The unit should be returned to the manufacturer for testing and recalibration.

6 Troubleshooting

Type of Malfunction	Possible Cause	Correction
No reading on display after pressing “Power” button.	– Determine if battery is installed and functional.	• Replace batteries according to section 7.1.
UV Output is zero.	– Wrong orientation of the unit.	• Put the unit in the system with sensor side up.
UV Output is low.	– Contaminated sensor window.	• Clean sensor window with an isopropyl alcohol or acetone.

7 Care and Maintenance

7.1 Maintenance

Keep the sensor window clean to eliminate possible error. Use a soft tissue or a cotton swab and isopropyl alcohol or acetone to clean the sensor window.

If the batteries have low voltage, the sign LOW BATTERY will be blinking in the right top part of the LCD display. To install batteries, unscrew two cover screws and take out the old batteries. Then put new batteries in the battery compartment observing polarity. Replace the cover and secure it with two screws (see section 2).

8 WARRANTY

Henkel expressly warrants that all products referred to in this Instruction Manual for the Zeta® 7011 Dosimeter-Radiometer (hereafter called “Products”) shall be free from defects in materials and workmanship. Liability for Henkel shall be limited, as its option, to replacing those Products which are shown to be defective in either materials or workmanship or to credit the purchaser the amount of the purchase price thereof (plus freight and insurance charges paid therefor by the user). The purchaser’s sole and exclusive remedy for breach of warranty shall be such replacement or credit.

A claim of defect in materials or workmanship in any Products shall be allowed only when it is submitted in writing within one month after discovery of the defect or after the time the defect should reasonably have been discovered and in any event, within (12) months after the delivery of the Products to the purchaser. No such claim shall be allowed in respect of products which have been neglected or improperly stored, transported, handled, installed, connected, operated, used or maintained or in the event of unauthorized modification of the Products including, where products, parts or attachments for use in connection with the Products are available from Henkel, the use of products, parts or attachments which are not manufactured by Henkel, no claim shall be allowed.

No Products shall be returned to Henkel for any reason without prior written approval from Henkel. Products shall be returned freight prepaid, in accordance with instructions from Henkel.

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